

SUPPORT FOR THE AMENDMENTS

This Amendment amends Claim 1. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claim 1 is found in the specification at page 6, lines 26-27. No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-2, 5-8, 10-15 and 17-24 will be pending in this application. Claim 1 is independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the December 20, 2005, personal interview.

As discussed at the interview, the present invention relates to a silica slurry that can be used for polishing semiconductor materials. To obtain polishing accuracy and speed, it is necessary that silica powder be well dispersed in the slurry, that the slurry have low viscosity, and that the slurry viscosity exhibit stability with the passage of time even for high silica concentrations. See, specification at page 2, lines 10-13.

In conventional fumed silica dispersion slurries, the silica concentration is limited to less than about 40%. If the silica concentration is more than 40%, slurry flowability is easily lost and viscosity stability with the passage of time is low. This is particularly a problem with slurries containing fine silica powder, e.g., fumed silica having an average primary particle size of from 7 to 50 nm. Agglomeration of fine silica powder frequently occurs, which results in a particle size at the time of polishing that is not uniform, and a viscosity change with the passage of time that is large. Specification at page 2, lines 14-22.

In contrast, the present invention provides a fumed silica slurry having a low viscosity of less than 1000 mPa•s even for a silica concentration of more than 50% by weight. Furthermore, the silica slurry of the present invention exhibits little viscosity change with the passage of time. These slurry characteristics are achieved by using a fumed silica powder, made by a dry process, in which (i) the average primary particle size (DT) is in a range of from 0.08 μ m to 0.8 μ m and (ii) the ratio (DL/DT) of the average particle size (DL) and the average primary particle size (DT) is less than 1.3. Specification at page 8, line 27 to page 9, line 6. The ratio (DL/DT) reflects the agglomeration of particles. Specification at page 5, lines 26-27; page 13, Table 1.

In the field of semiconductor polishing, a slurry using colloidal silica has good dispersibility and stability, but low purity. In contrast, a slurry using fumed silica has high purity, but poor dispersibility and stability. The high concentration fumed silica slurry of the present invention combines high purity with good dispersibility and stability.

Claims 1-2, 5-6 and 21-24 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 3,673,104 ("Albrecht"). In addition, Claims 7-8, 10-15 and 17-20 are rejected under 35 U.S.C. § 103(a) over Albrecht in view of U.S. Patent No. 4,588,421 ("Payne").

Albrecht and Payne disclose precipitated silica formed by a wet process.

It is well known that the properties of precipitated silica are very different from those of fumed silica. Precipitated silica generally contains residual metal ions or organic compounds depending upon the production process. On the other hand, fumed silica is made by hydrolysis and/or oxidation of silane or silanol compounds in a flame. Thus, methods used to produce fumed silica can produce metal ion impurity free silica that is suitable for chemical mechanical polishing of semiconductor materials. Moreover, the physical properties of precipitated silica and fumed silica are different in specific weight, hardness and dispersibility in aqueous solvents.

Albrecht and Payne are silent about fumed silica and fail to suggest the independent Claim1 limitations of "a high concentration silica slurry, consisting of: a fumed silica dispersed in a solvent".

Thus, the rejections under 35 U.S.C. § 103(a) should be withdrawn.

During the personal interview on December 20, 2005, the Examiner cited U.S. Patent No. 3,855,145 ("Vossos"); U.S. Patent No. 5,030,286 ("Crawford"); and U.S. Patent No. 6,699,808 ("Schwertfeger").

Vossos and Crawford disclose precipitated silica made by a wet process.

However, Vossos and Crawford fail to suggest the independent Claim1 limitations of "a high concentration silica slurry, consisting of: a fumed silica dispersed in a solvent".

Schwertfeger discloses a mixture of fused silica and fumed silica for use in forming green bodies that have nearly the same shape before and after sintering. Fused silica is produced by heating silica to high temperatures. Fused silica particles are too hard to be suitable for chemical mechanical polishing.

However, Schwertfeger fail to suggest the independent Claim1 limitations of "a high concentration silica slurry, consisting of: a fumed silica dispersed in a solvent".

In view of the foregoing remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

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